DOCUMENT RESUME

ED 380 283 SE 055 911

TITLE	Pest Control in the School Environment: Adopting Integrated Pest Management.
INSTITUTION	Environmental Protection Agency, Washington, D.C. Office of Pesticide Programs.
REPORT NO	EPA-735-F-93-012
PUB DATE	Aug 93
NOTE	50p.
AVAILABLE FROM	Public Information Center, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460.
PUB TYPE	Guides - Non-Classroom Use (055)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Elementary Secondary Education; Environmental Education; *Pesticides; *School Buildings
IDENTIFIERS	*Integrated Pest Management

ABSTRACT

As the public becomes more aware of the health and environmental risks pesticides may pose, its interest in seeking the use of equally effective alternative pest control methods increases. School administrators and other persons who have pest control decision-making responsibilities for school buildings and grounds can use this guide to become aware of Integrated Pest Management (IPM), a pest control method that may be an alternative to scheduled spraying of pesticides. Each step in a seven-step procedure for implementing an IPM program is examined: (1) developing an official policy statement for school pest management; (2) designating pest management roles; (3) setting pest management objectives for sites; (4) inspecting, identifying, and monitoring; (5) setting action thresholds; (6) applying IPM strategies; and (7) evaluating results and record keeping. Includes an evaluation of the long-term costs associated with IPM programs. (LZ)

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United States
Environmental Protection
Agency

Office of Pesticide Programs
(H7506C)

EPA 735-F-93-012
August 1993

EPA

Pest Control in the School Environment:

Adopting Integrated Pest Management

ED 380 283

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As a mother, I understand the importance of a healthy school environment in which to educate our children. As an environmentalist, I understand the need to eliminate the unnecessary use of any toxic chemical. The use of integrated pest management (IPM) in and around school buildings addresses both of these concerns while preparing our children to become tomorrow's environmental stewards. This booklet will provide you with a general understanding of IPM principles, so that you may make an informed decision about pest control in your neighborhood schools. As EPA's Administrator, I encourage all schools to reduce the use of pesticides by adopting integrated pest management.

Carol Browner

Administrator

Environmental Protection Agency

Pest Control in the School Environment:
Adopting Integrated Pest Management

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Acknowledgements

Important and sensitive issues are involved in adopting integrated pest management in schools, and a diverse group of individuals was sought to help the U.S. Environmental Protection Agency (EPA) develop this booklet. Special appreciation is expressed to the following people for their assistance. Please note, however, that the organizations with which these individuals are affiliated do not necessarily endorse all views expressed in this document.

Allen C. Abend
Maryland State Department of Education

Anne W. Bloom and Nancy B. Watzman
Public Citizen

Susan J. Cooper
National Coalition Against the Misuse of Pesticides

Bonny L. Dodson
National Pest Control Association

William Forbes
Montgomery County [Maryland] Public Schools

Nancy Thorndike Greenspan
Parent

M. Shaheed Khan, Ph.D.
University of the District of Columbia Extension Service

Glenn H. Laycock
Residex Corporation

Michael R. Pontti
Georgetown University
Facilities Management
Landscape Department

Josie Scholz
Parent

Can Children's Exposure to Pesticides be Reduced in the School Environment?

IPM and Your School

The public's concerns about health and environmental risks associated with chemicals are increasing, particularly when children are involved. As the public becomes more aware of the health and environmental risks pesticides may pose, its interest in seeking the use of equally effective alternative pest control methods increases. School administrators and other persons who have pest control decision-making responsibilities for school buildings and grounds should become aware of the pest control options available to them. It is in everyone's best interest to reduce exposure to potentially harmful chemicals.

The Environmental Protection Agency (EPA) has prepared this booklet to acquaint readers with Integrated Pest Management (IPM), a pest control method that may be an alternative to scheduled spraying of pesticides. Schools across the nation that have adopted such programs report successful, cost-effective conversion to IPM. IPM can reduce the use of chemicals and provide economical and effective pest suppression.

This booklet has been developed to **encourage** and assist school officials in examining and improving their pest management practices. It identifies ways to reduce dependence on pesticides in school buildings and landscapes and discusses alternative methods for managing pests commonly found in schools. School officials are not, however, required by law to adopt the practices recommended in this booklet.

All information provided in this booklet may be reproduced and can be shared with anyone interested in an IPM program.

IPM can reduce the use of chemicals and provide economical and effective pest suppression.

IPM programs use current, comprehensive information on the lifecycles of pests and their interactions with the environment.

What is Integrated Pest Management?

IPM is an effective and environmentally sensitive approach to pest management that relies on a combination of commonsense practices. IPM programs use current, comprehensive information on the life cycles of pests and their interactions with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment. IPM programs take advantage of *all* pest management options possibly including, but not limited to, the judicious use of pesticides.

Understanding pest needs is essential to implementing IPM effectively. Pests seek habitats that provide basic needs such as air, moisture, food, and shelter. Pest populations can be prevented or controlled by creating inhospitable environments, by removing some of the basic elements pests need to survive, or by simply blocking their access into buildings. Pests may also be managed by other methods such as traps, vacuums, or pesticides. An understanding of what pests need in order to survive is essential before action is taken.

Pests seek habitats which provide basic needs such as air, moisture, food, and shelter.

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Establishing an IPM Program for Schools

An efficient IPM program can be integrated with the school's existing pest management plan and other school management activities.

An efficient IPM program can be integrated with the school's existing pest management plan and other school management activities. School management activities such as preventive maintenance, janitorial practices, landscaping, occupant education, and staff training are all part of an IPM program. The following steps are required to develop an IPM decision network:

Step 1:

Develop an official IPM policy statement. This useful first step in making the transition from a conventional pesticide program to an IPM program goes beyond simply stating a commitment to support and implement an IPM approach. It acts as a guide for the pest manager to use in developing a specific IPM program.

Step 2:

Designate pest management roles for occupants, pest management personnel, and key decision-makers; assure good communications among them; and educate or train the people involved in their respective roles.

Step 3:

Set pest management objectives for the site(s). For every site, pest management objectives will differ. The type of pest management sought should be outlined.

Step 4:

Inspect site(s) and identify and monitor pest populations for potential problems.

Step 5:

Set action thresholds. These are the levels of pest populations or site environmental conditions that require remedial action.

Step 6:

Apply IPM strategies to control pests. These include redesigning and repairing structures, improving sanitation, employing pest-resistant plant varieties, establishing watering and mowing practices, and applying pesticides judiciously.

Step 7:

Evaluate results to determine if pest management objectives are reached, and keep written records of all aspects of the program.

Apply IPM strategies to control pests.

STEP 1

Developing an Official Policy Statement for School Pest Management

A policy statement for school pest management should state the intent of the school administration to implement an IPM program. It should briefly provide guidance on what specifically is expected—the incorporation of existing services into an IPM program and the education and involvement of students, staff, and pest manager. The model policy statement in Figure 1 is provided as an example and may be modified in any way by schools to reflect site-specific needs or intent.

Figure 1.
Model Policy Statement

School Pest Management Policy Statement

Structural and landscape pests can pose significant problems to people, property, and the environment. Pesticides can also pose risks to people, property, and the environment. It is therefore the policy of this School District to incorporate Integrated Pest Management (IPM) procedures for control of structural and landscape pests.

Pests

Pests are populations of living organisms (animals, plants, or microorganisms) that interfere with use of the school site for human purposes. Strategies for managing pest populations will be influenced by the pest species and whether that species poses a threat to people, property, or the environment.

Pest Management

Approved pest management plans should be developed for the site and should include any proposed pest management measures.

Pests will be managed to:

- Reduce any potential human health hazard or to protect against a significant threat to public safety.
- Prevent loss of or damage to school structures or property.
- Prevent pests from spreading into the community, or to plant and animal populations beyond the site.
- Enhance the quality of life for students, staff, and others.

Integrated Pest Management Procedures

IPM procedures will determine when to control pests and whether to use mechanical, physical, chemical, cultural, or biological means. IPM practitioners depend on current, comprehensive information on the pest and its environment and the best available pest control

methods. Applying IPM principles prevents unacceptable levels of pest activity and damage by the most economical means and with the least possible hazard to people, property, and the environment.

The choice of using a pesticide will be based on a review of all other available options and a determination that these options are not acceptable or are not feasible. Cost or staffing considerations alone will not be adequate justification for use of chemical control agents, and selected non-chemical pest management methods will be implemented whenever possible to provide the desired control. It is the policy of this School District to utilize IPM principles to manage pest populations adequately. The full range of alternatives, including no action, will be considered.

When it is determined that a pesticide must be used in order to meet important management goals, the least hazardous* material will be chosen. The application of pesticides is subject to the Federal Insecticide, Fungicide, and Rodenticide Act (7 United States Code 136 et seq.), School District policies and procedures, Environmental Protection Agency regulations in 40 Code of Federal Regulations, Occupational Safety and Health Administration regulations, and state and local regulations.

Education

Staff, students, pest managers, and the public will be educated about potential school pest problems and the IPM policies and procedures to be used to achieve the desired pest management objectives.

Record Keeping

Records of pesticide use shall be maintained on site to meet the requirements of the state regulatory agency and School Board. Records must be current and accurate if IPM is to work. In addition, pest surveillance data sheets that record the number of pests or other indicators of pest populations are to be maintained to verify the need for treatments.

Notification

This School District takes the responsibility to notify the school staff and students of upcoming pesticide treatments. Notices will be posted in designated areas at school and sent home to parents who wish to be informed in advance of pesticide applications.

Pesticide Storage and Purchase

Pesticide purchases will be limited to the amount authorized for use during the year. Pesticides will be stored and disposed of in accordance with the EPA-registered label directions and state regulations. Pesticides must be stored in an appropriate, secure site not accessible to students or unauthorized personnel.

Pesticide Applicators

Pesticide applicators must be educated and trained in the principles and practices of IPM and the use of pesticides approved by this School District, and they must follow regulations and label precautions. Applicators should be certified and comply with this School District IPM policy and Pest Management Plan.

* Precautionary statements are required on all pesticide labels. Signal words indicate the level of acute toxicity, the hazard to humans posed by the pesticide product. Every label bears the child hazard warning: Keep Out of Reach of Children.

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Notices will be posted in designated areas at school and sent home to parents who wish to be informed of upcoming pesticide applications.

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Step 2

Designating Pest Management Roles

The concepts and methods of IPM were developed originally in agricultural settings. Later, it was found that IPM had great value in school pest management as well. The interactions of the people involved in a school pest management system are the key to the success or failure of the program. When the respective roles of all the people in the pest management system are identified and agreed upon, and when these people communicate well with each other, effective and less expensive protection of the site and the people can be achieved with fewer risks.

In successful urban pest management systems, people function effectively as occupants, pest managers, or decision-makers, gaining the information they need, giving the information that others need, cooperating with each other, and meeting their special responsibilities to achieve the unique pest management objectives of the site. These functions and responsibilities are identified below and should be outlined in the school's pest management plan.

Students and Staff—The Occupants

Occupants are concerned about the safety of the pest control methods used, about their effectiveness, and about possible adverse effects. School staff, students, and their parents should receive information addressing these concerns and their roles in the school's pest management system.

The most important responsibility of the students and staff is sanitation. Much of the prevention and reduction of pest infestation at the school site depends on whether or not students and staff clean up food leftovers, food in lockers, gum

Occupants are concerned about the safety of the pest control methods used, about their effectiveness, and about possible adverse effects.

Prevention and reduction of pest infestation at the school site depends on whether or not students and staff clean up food leftovers, food in lockers, gum under desks, paper clutter, etc.

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under desks, paper clutter, etc., or perform proper maintenance. In addition, because people at the school site may observe the presence of pests, they should report any evidence of pest activity.

Other actions may be required of students and staff or undertaken by them, depending on their interest in the site and the pest management system. The more occupants "buy in" to this, the better the pest management system will work.

Parents' Special Roles

Parents have the most responsibility for their children, and they are their children's natural advocates. Thus, parents can bring the need to reduce dependence on pesticides to the attention of school personnel, and they can assist greatly in the transition to an IPM program.

Parents' first school pest management responsibility is to learn about IPM practices and follow them at home so that pests are not carried to school in notebooks, lunch boxes, clothing, or the children's hair. Second, parents should be aware of the current pest management practices in their children's schools. The schools should welcome questions by the parents and encourage the parents to seek information. Visible interest and concern on the parents' part is a valuable resource and stimulus for the implementation of a school IPM program. Parents may express their views to the school superintendent, School Board, school district management, and the school's Parent Teacher Associations (PTA). Parents may participate on IPM advisory or oversight committees with school and government management.

The Pest Manager

In a pest management system, the pest manager is the person who observes and evaluates the site, or directs others to do so, and decides what needs to be done to achieve the site pest management

Parents have the most responsibility for their children, and they are their children's natural advocates.

objectives. The pest manger could be the school principal, the custodian, a designated faculty member or an individual under contract to the school system. The pest manager designs a pest management system that takes into account potential liability, applicator and occupant safety, costs, effectiveness, time required, and customer or occupant satisfaction.

The pest manager draws on knowledge gained through prior training and uses information on the site, the pest and its biology, occupant health and concerns, appropriate control measures, and expected results. The pest manager also performs the necessary pest management actions or directs others in the actions to be taken.

Because the pest manager usually has the responsibility of keeping both the occupants and school administrators informed, he or she has the greatest need for available information about the site, pest, and appropriate pest management methods.

The system for the site must achieve the goals within the limitations posed by safety, time, money, and available materials. Pest managers monitor the site and the pest population to determine if actions taken are successful and must keep accurate records of the amount and location of any pesticides used and dates of each application.

Decision-Makers

Generally, persons who authorize the pest management program and control the money for pest management are people involved in the direct management or administration of the school or schools, such as a superintendent or assistant superintendent of schools. However, a person indirectly involved with the site may become a pest management decision-maker, e.g., the health department inspector. On other occasions, the purchasing agent or contracting officer for a school system or district may be a major decision-maker for a school site.

For decision-makers, concerns about costs, liability, time expended, method effectiveness, safety, and customer or occupant satisfaction are foremost. These decision-makers also determine if the pest manager is performing at an acceptable level and if the pest management objectives are being met. Among other methods, this assessment can be done by monitoring complaints from the occupants, by observing the site environment, or by a combination of both. Decision-makers must also provide the necessary level of financial commitment for any IPM program to succeed.

A great deal of understanding, cooperation, and commitment from everyone in the system—students and parents, school staff, managers, administrators, and the public—is needed in order for an IPM program to succeed.

Educating IPM Participants

A school IPM program should include a commitment to the education of students, staff, and parents. This education should include not only the teachers, but also school nurses, cafeteria employees, and housekeeping and administrative personnel as well. All occupants must understand the basic concepts of IPM and who to contact with questions or problems. Specific instructions should be provided on what to do and what not to do. For example, staff should not bring and use pesticides on their own on school sites. All pesticide products, including those purchased at a retail store, should be applied only by designated qualified personnel. Educating and training staff to function within an IPM context is important to the success of an in-house IPM program. (Note: More specific training is required for the pest manager. Universities and State Cooperative

A school IPM program should include a commitment to the education of students, staff and parents.

Extension Services have the expertise to meet most IPM training needs. Needed training materials that are not already available can be developed jointly between the School District and the Extension Service.)

Education is a vital component of pest management. Many schools across the United States have incorporated environmental issues into their curricula. Science classes might include discussions and activities to learn more about the fascinating and diverse roles of insects, plants, rodents, and birds in our world. Most are harmless, and many—e.g., some spiders, predatory mites, centipedes, and certain beetles—are actually beneficial in controlling pest populations. If good sanitation is practiced, the population of these beneficial insects can be kept at tolerable levels.

All staff at the school should learn about the basic concepts of IPM and how these principles are being applied in their particular school. Staff and students need to understand how their own behavior helps alleviate or contributes to pest problems. School staff should encourage the Parent Teacher Associations, student organizations, and other school-affiliated groups to participate in the IPM program.

Step 3

Setting Pest Management Objectives for School Buildings and Other Sites

Pest management objectives differ from site to site, and these differences must be considered before setting action threshold levels. (See Step 5.) For example, for an athletic field, the objective would be to maintain healthy turf as well as a specific type of playing surface. With ornamental plants, the objective would more likely be to maintain aesthetic value. With buildings or other structures, the main objective might be controlling damage caused by termites. Schools should outline specific objectives in a pest management plan.

Examples of pest management objectives include—

(1) Manage pests that may occur on school sites to prevent interference with the learning environment of the students.

(2) Eliminate injury to students, staff, and other occupants.

(3) Preserve the integrity of the school buildings or structures.

(4) Provide the safest playing or athletic surfaces possible.

Routine inspection and accurate identification of pests are vital steps in IPM to ensure that control methods will be effective.

Step 4

Inspecting, Identifying, and Monitoring

An **IPM** program consists of a cycle of inspecting, identifying, monitoring, evaluating, and choosing the appropriate method of control. Routine inspection and accurate identification of pests are vital steps in IPM to ensure that control methods will be effective. Once the pest has been identified and the source of its activity pinpointed, habitat modifications—primarily, exclusion, repair, and sanitation efforts—may greatly reduce the prevalence of the pest. Monitoring includes inspecting areas for pest evidence, entry points, food, water, and harborage sites, and estimating pest population levels. The information gained through monitoring is evaluated to determine whether the action threshold has been exceeded and what can be done in the way of prevention.

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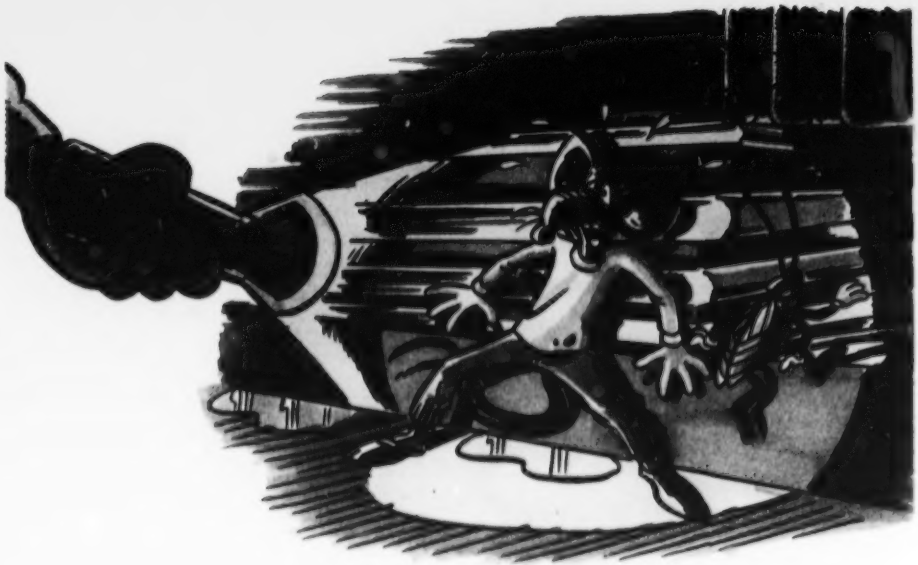

Once the pest has been identified and the source of its activity pinpointed, habitat modifications—primarily, exclusion, repair, and sanitation efforts—may greatly reduce the prevalence of the pest.

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Step 5

Setting Action Thresholds

An action threshold is the level at which action is initiated. It is determined by deciding, based on the sensitivities of the school occupants, how many pests can be tolerated. The action threshold is set by the pest manager and the occupants and should reflect the pest management objective for the site. The presence of some pests does not, in itself, necessarily require action.

When pest populations exceed pre-set action thresholds, action must be taken. Precise recommendations or actions to achieve specific results are an essential part of an IPM program. Specific recommendations, including an explanation of the benefits, should be based on the evaluation of all available data obtained through inspecting, identifying, and monitoring.

The action threshold is set by the pest manager and the occupants and should reflect the pest management objective for the site.

Step 6

Applying IPM Strategies

Pest-prevention measures can be incorporated into existing structures. Such preventive measures reduce the need for pesticide applications and include sanitation and structural repair, employing physical and mechanical controls such as screens, traps, weeders, air doors, etc. Specific IPM strategies for specific school sites are provided below. (Note: Every school will experience slightly different combinations of pests.)

IPM Strategies for Indoor Sites

Typical Pests:

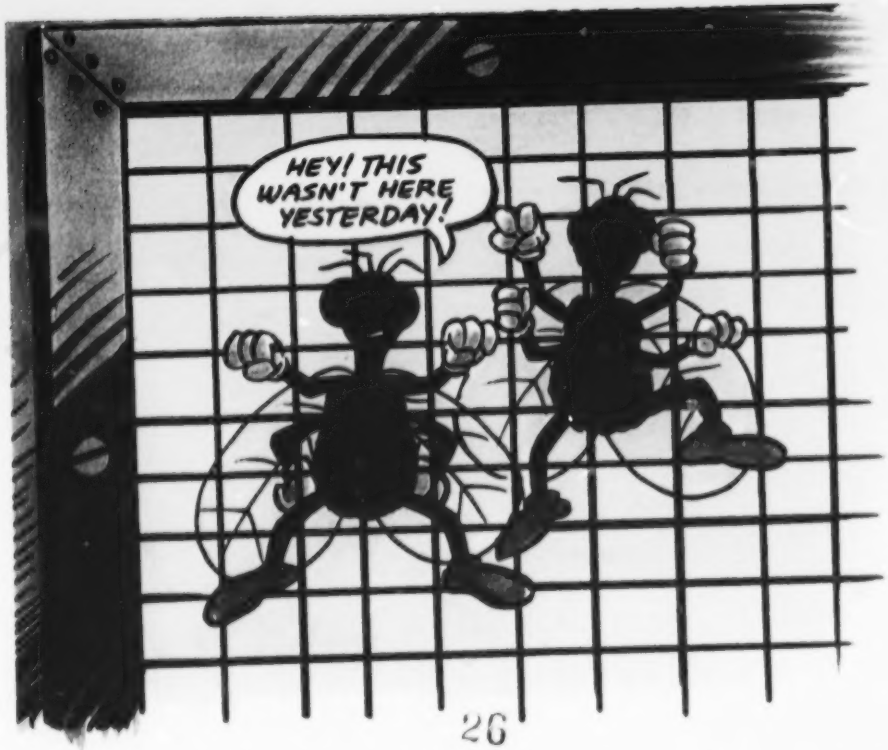
Mice, rats, cockroaches, ants, flies, wasps, hornets, yellow jackets, spiders, microorganisms, termites, carpenter ants, and other wood-destroying insects. Although beneficial as predators, wasps, hornets, yellow jackets, and spiders can be troublesome.

Entryways

(doorways, overhead doors, windows, holes in exterior walls, openings around pipes, electrical fixtures, or ducts):

- Keep doors shut when not in use.
- Place weather stripping on doors.
- Caulk and seal openings in walls.
- Install or repair screens.
- Install air curtains.
- Keep vegetation, shrubs, and wood mulch at least 1 foot away from structures.

Install or repair screens.



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Classrooms and Offices

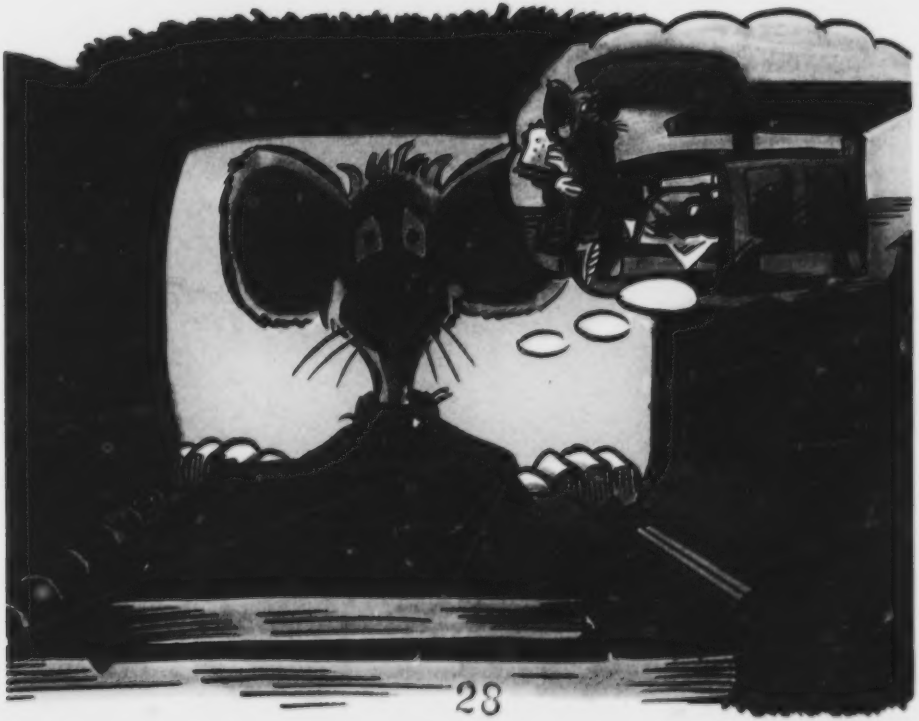
(classrooms, laboratories, administrative offices, auditoriums, gymnasiums, and hallways):

- Allow food and beverages only in designated areas.
- If indoor plants are present, keep them healthy. When small insect infestations appear, remove them manually.
- Keep areas as dry as possible by removing standing water and water-damaged or wet materials.
- In the science lab, store animal foods in tightly sealed containers and regularly clean cages. In all areas, remove dust and debris.
- Routinely clean lockers and desks.
- Frequently vacuum carpeted areas.
- If students get head lice, consult with your local health department and have their parents contact a physician. Discourage students from exchanging hats or caps at school.

Food Preparation and Serving Areas

(dining room, main kitchen, teachers' lounge, home economics kitchen, snack area, vending machines, and food storage rooms):

- Store food and waste in containers that are inaccessible to pests. Containers must have tight lids and be made of plastic, glass, or metal. Waste should be removed at the end of each day.
- Place screens on vents, windows, and floordrains to prevent cockroaches and other pests from using unscreened ducts or vents as pathways.
- Create inhospitable living conditions for pests by reducing availability of food and water—remove food debris, sweep up all crumbs, fix dripping faucets and leaks, and dry out wet areas.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- Improve cleaning practices, including promptly cleaning food preparation equipment after use and removing grease accumulation from vents, ovens, and stoves. Use caulk or paint to seal cracks and crevices.
- Capture rodents by using mechanical or glue traps. (Note: Place traps in areas inaccessible to children. Mechanical traps, including glueboards, used in rodent control must be checked daily. Dispose of killed or trapped rodents within 24 hours.)

Rooms and Areas With Extensive Plumbing

(bathrooms, rooms with sinks, locker rooms, dishwasher rooms, home economics classrooms, science laboratories, swimming pools, and greenhouses):

- Promptly repair leaks and correct other plumbing problems to deny pests access to water.
- Routinely clean floor drains, strainers, and grates. Seal pipe chases.
- Keep areas dry. Avoid conditions that allow formation of condensation. Areas that never dry out are conducive to molds and fungi. Increasing ventilation may be necessary.
- Store paper products or cardboard boxes away from moist areas and direct contact with the floor or the walls. This practice also allows for ease in inspection.

Maintenance Areas

(boiler room, mechanical room, janitorial-housekeeping areas, and pipechases):

- After use, promptly clean mops and mop buckets; dry mop buckets and hang mops vertically on rack above floor drain.
- Allow eating only in designated eating areas.

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Capture rodents by using mechanical or glue traps.

- Clean trash cans regularly, use plastic liners in trash cans, and use secure lids.
- Keep areas clean and as dry as possible, and remove debris.

IPM Strategies for Outdoor Sites

Typical Pests:

Mice and rats. Turf pests—broad-leaf and grassy weeds, insects such as beetle grubs or sod webworms, diseases such as brown patch, and vertebrates such as moles. Ornamental plant pests—plant diseases, and insects such as thrips, aphids, Japanese beetles, and bag worms.

Playgrounds, Parking Lots, Athletic Fields, Loading Docks, and Refuse Dumpsters:

- Regularly clean trash containers and gutters and remove all waste, especially food and paper debris.
- Secure lids on trash containers.
- Repair cracks in pavement and sidewalks.
- Provide adequate drainage away from the structure and on the grounds.

Turf

(lawns, athletic fields, and playgrounds):

- Maintain healthy turf by selecting a mixture of turf types (certified seed, sod, or plugs) best adapted for the area. Check university or Cooperative Extension service for recommendations on turf types, management practices, or other information.
- Raise mowing height for turf to enhance its competition with weeds; adjust cutting height of mower, depending on the grass type; sharpen mower blades; and vary mowing patterns to help reduce soil compaction.
- Water turf infrequently but sufficiently during early morning hours to let turf dry out before nightfall; let soil dry slightly between waterings.

Secure lids on trash containers.

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- Provide good drainage, and periodically inspect turf for evidence of pests or diseases.
- Allow grass clippings to remain in the turf (use a mulching mower or mow often) or compost with other organic material.
- Have the soil tested to determine pH and fertilizer requirements.
- Use a dethatcher to remove thatch. Do this in early fall or early spring when the lawns can recover and when overseeding operations are likely to be more successful.
- Time fertilizer application appropriately, because excessive fertilizer can cause additional problems, including weed and disease outbreaks. Apply lime if necessary. Use aeration to place soil on top of thatch so that microbes from soil can decompose thatch.
- Seed over existing turf in fall or early spring.
- Obtain more information on turf from EPA's brochure entitled, *Healthy Lawn, Healthy Environment: Caring for Your Lawn in an Environmentally Friendly Way.*

Ornamental Shrubs and Trees:

- Apply fertilizer and nutrients to annuals and perennials during active growth and to shrubs and trees during dormant season or early in the growing season.
- If using a fertilizer, use the correct one at the suitable time, water properly, and reduce compaction.
- Prune branches to improve plants and prevent access by pests to structures.
- Use the appropriate pest-resistant variety (check with your local Cooperative Extension Service), and properly prune for growth and structure.
- Correctly identify the pest in question. When in doubt, send several

Raise mowing height for turf to enhance its competition with weeds.

specimens to your local Cooperative Extension Service. Once the pest is identified, recommendations can be made.

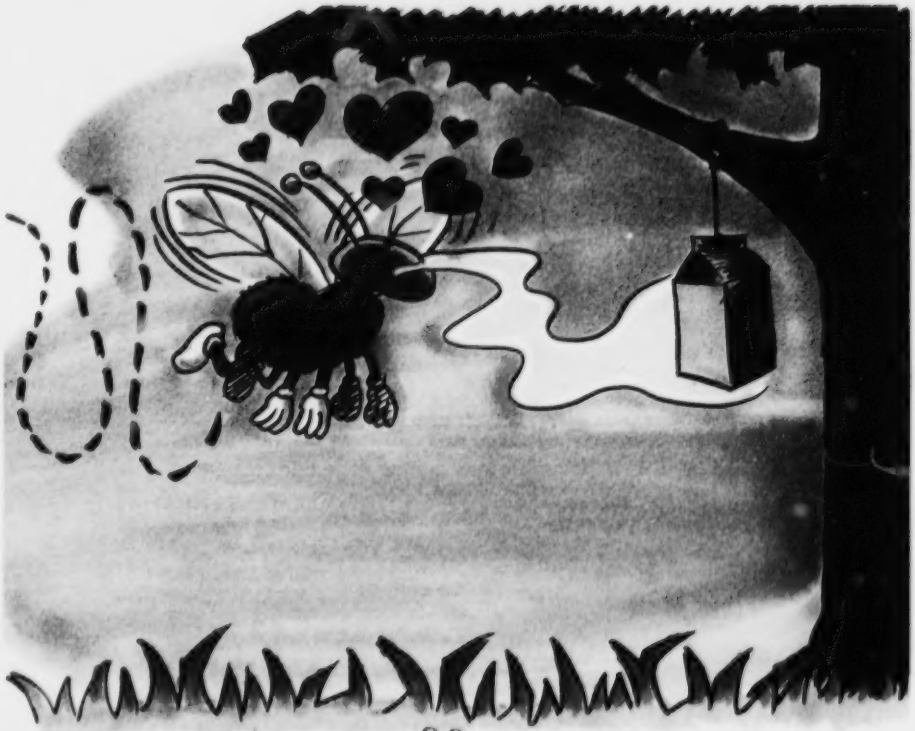
- Use pheromone traps as a time-saving technique for determining the presence and activity periods of certain pest species. Pheromones are chemicals released by various organisms as means of communication with others of the same species, usually as an aid to mating.
- Select replacement plant material from among the many disease-resistant types being developed by plant breeders throughout the country.
- Check with your local State Cooperative Extension Service or university for information on plant types appropriate for your site.
- Remove susceptible plants if a plant disease recurs and requires too many resources, such as time, energy, personnel, or money. Some ornamental plants, trees, and turf are so susceptible to plant diseases that efforts to keep them healthy may be futile.

Applying Pesticides Judiciously

Many different kinds of pesticides are currently available for use against urban and structural pests. An appropriate application uses the least toxic and most effective and efficient technique and material. Due to their potentially toxic nature, these materials should be applied by qualified applicators in a manner to ensure maximum efficiency, with minimal hazard. Pesticides should be applied only when occupants are not present in areas where they may be exposed to materials applied.

Although EPA registers pesticides for use within the United States, the fact that a particular product is registered does not mean that it is "safe" under all conditions

Use pheromone traps as a time-saving technique for determining the presence and activity periods of certain pest species.



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of use. All pesticides used in the U.S. must be EPA registered, and the registration number must be listed on the label. Read and follow the pesticide label directions, know how to apply and handle these chemicals, and try to minimize the exposure to children, adults, and other non-target species.

The following general recommendations should minimize exposure to people and other non-target species when the application of pesticides is being considered:

- Read and follow all label instructions.
- Choose a pesticide that is labeled for the specific site, intended for the pest you are trying to control, and as target specific as possible, rather than broad spectrum.
- Use a spot-treatment method of application when pesticide treatments are required. Treat only the obviously infested plants in an area. This procedure helps conserve predators and parasites needed to reduce future pest populations and increases the time between pest outbreaks.
- Limit the use of sprays, foggers, or volatile formulations. Instead use bait and crack and crevice application when possible. Look for crack and crevice label instructions on how to apply the pesticide. These treatments maximize the exposure of the pest to the pesticide while minimizing pesticide exposure for the occupants.
- Place all rodenticides either in locations not accessible to children and non-target species or in tamper-resistant bait boxes. Outdoors, place bait inside the entrance of an active rodent burrow, and then collapse the burrow entrance over the bait to prevent non-target species' access. Securely lock or fasten shut the lids of all bait boxes. Place bait in the

Check for state recommendations and requirements for pesticide storage.

Schools should consider posting notices in areas to be treated or that have been treated.

baffle-protected feeding chamber of the box. Never place bait in the runway of the box.

- Apply only when occupants are not present or in areas where they will not be exposed to the material applied. Note any re-entry time limits listed on the label, and be aware that some residues can remain long after application.
- Use proper protective clothing or equipment when applying pesticides.
- Properly ventilate areas after pesticide application.
- Notify students, staff, and interested parents of upcoming pesticide applications if that is part of the school pest management policy. Pay particular attention to those individuals that may be at higher risk.
- Keep copies of current pesticide labels, consumer information sheets, and Material Safety Data Sheets (MSDS) easily accessible.

Storing Pesticides

Store pesticides off site or in buildings that are locked and inaccessible to all undesignated personnel. Be sure adequate ventilation is provided for the pesticide storage area. Store herbicides separately to avoid potential damage to plants from the absorption of vapors onto other pesticides stored nearby. Avoid storing pesticides in places where flooding is possible or in open places where they might spill or leak into the environment. Store flammable liquids away from an ignition source. Check for state recommendations and requirements for pesticide storage.

If pesticides are stored in occupied buildings, take special care to ensure that the air in the occupied spaces does not get contaminated. Place a notice outside the designated storage area. Store all pesticides in their original containers,

and secure lids tightly. Make sure that childproof caps are properly fastened. However, even closed pesticide containers may release toxic chemicals to the air through volatilization. Therefore, store pesticides only in spaces that are physically separated and closed off from occupied spaces and where there is adequate exhaust ventilation (i.e., the air is vented directly to the outside). In addition, precautions are needed to ensure that the air in the storage space has no chance of mixing with the air in the central ventilation system.

The pest manager is responsible for periodically checking stored pesticide containers for leaks or other hazards. To reduce pesticide storage problems, buy only enough of the pesticide product to last through the use season. Mix only the amount of pesticide needed for the immediate application.

Posting and Notification

Local law may require schools to notify students and staff of impending pesticide applications. If not, the school system may take the responsibility of informing school staff and students' parents of upcoming pesticidal treatments. When good IPM practices are followed, concerns raised by notification and posting activities may be minimized. If notification and posting is a new practice at the school, the new policy should be explained so that it will not be misinterpreted to imply that more pesticides are being applied than previously.

Notification can be accomplished by posting notices around the school and sending notices home to those parents who wish to be informed in advance of pesticide applications. Schools should consider posting notices in areas to be treated or that have been treated. The school pest manager should be prepared and be available to provide more specific

Store pesticides only in spaces that are physically separated and closed off from occupied spaces.

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information to concerned parents and others.

A voluntary registry of individuals who could be adversely affected by exposure to pesticides can be kept at the school health or administrative offices. Information on how to contact the local poison control center and emergency personnel should be kept readily accessible. The school may also wish to consider informing the adjacent communities in advance of planned outdoor pesticide applications.

Capture rodents by using mechanical or glue traps.

STEP 7

Evaluating Results and Record Keeping

Successful practice of IPM relies on accurate record keeping. Record keeping allows the school to evaluate the results of practicing IPM to determine if pest management objectives have been met. Keeping accurate records also leads to better decision-making and more efficient procurement. Accurate records of inspecting, identifying, and monitoring activities show changes in the site environment (reduced availability of food, water, or shelter), physical changes (exclusion and repairs), pest population changes (increased or reduced numbers, older or younger pests), or changes in the amount of damage or loss.

A complete and accurate pest management log should be maintained for each property and kept in the office of the pest manager or property manager. Pesticide use records should also be maintained to meet any requirements of the state regulatory agency, School Board, and applicable local regulations. The log book should contain the following items:

- A copy of the Pest Management Plan and service schedule for the property.
- A copy of the current EPA-registered label and the current MSDS for each pesticide product used on school property.

- Pest surveillance data sheets, which record, in a systematic fashion, the type and number of pests or other indicators of pest population levels revealed by the monitoring program for the site. Examples include date, number, location, and rodent species trapped or carcasses removed as well as date, number, and location of new rat burrows observed.

- A diagram noting the location of pest activity, including the location of all traps, trapping devices, and bait stations in or around the site.

Evaluating the Costs

Preliminary indications from IPM programs in school systems suggest that long-term costs of IPM may be less than a conventional pest control program that relies solely on the use of pesticides. However, the long-term labor costs for IPM may be higher than those for conventional pesticide treatments. The labor costs may be offset by reduced expenditures for materials.

Whether an IPM program raises or lowers costs depends in part on the nature of the current housekeeping, maintenance, and pest management operations. The costs of implementing an IPM program can also depend on whether the pest management services are contracted, performed in-house, or both. To fit the IPM program into the existing budgetary framework, school administrators must consider what additional and redistributed expenditures are involved. As with any program, insufficient resources will jeopardize the success of IPM.

Potential Added Costs

Initiating an IPM program may require repair and maintenance activities to prevent pest entry and to eliminate sources of shelter, food, and moisture. Examples of these one-time expenses that may result in future budgetary savings include—

- Improving waste management by moving trash or garbage containers away from school buildings to reduce the opportunity for pest invasion. This cost is a one-time expense that will result in fewer pest problems and reduce the need for other pest control procedures.
- Installing physical barriers such as air curtains over the outside entrances to kitchens to reduce flying

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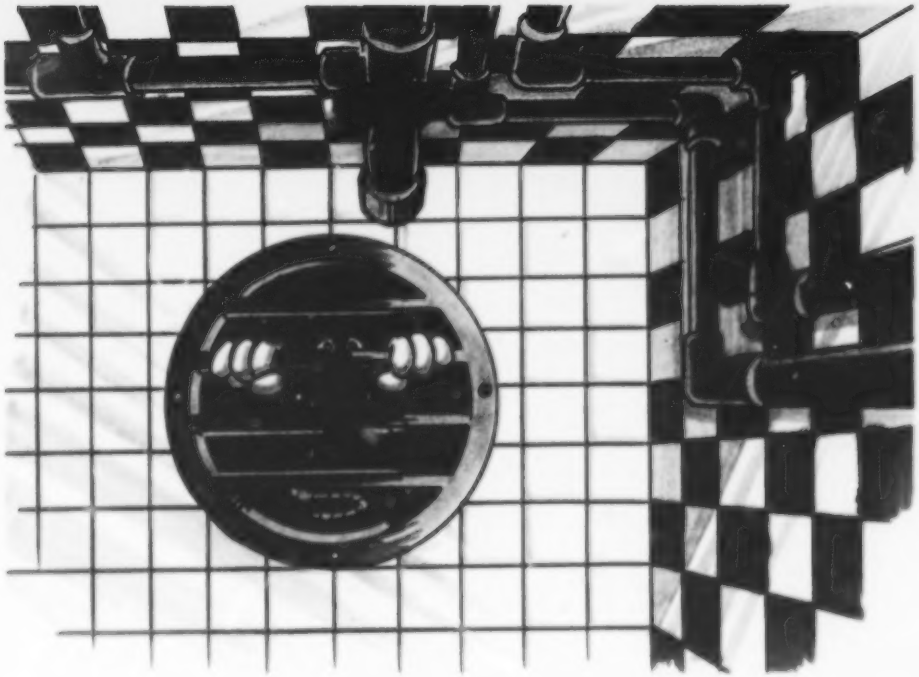

Place floordrains to prevent pests from using pipes as pathways. Keep areas as dry as possible by removing standing water and water damaged or wet materials.

Successful practice of IPM relies on accurate record keeping.

insect problems. This is also a one-time cost and results in fewer flying insect problems and a savings in years to come.

- Stepping up structural maintenance to correct such situations as leaky pipes. This effort reduces future maintenance problems, prevents pest problems, and saves money in the long term.
- Training and/or certifying staff in IPM. The amount of information necessary to implement IPM is greater than that required for conventional pest control. As a consequence, training or certifying staff in IPM will probably increase costs.
- Re-landscaping the area adjacent to buildings to discourage pests.

In the long term, these repair and maintenance activities will reduce overall costs of the pest control operation, as well as other maintenance and operating budgets. Whether these costs are actually budgeted as a pest control expense or under some other budgetary category depends on the budgetary format of the school system. School systems with an active maintenance and repair program may be able to absorb these activities within the current budget.

Procurement

Successful practice of IPM relies on accurate record keeping, which leads to more efficient procurement. As the IPM program progresses, predictable events and pest control needs will be identified. Close consultation with the pest management specialist is essential for good decisions on purchases within the budget.

Some non-pesticide products, such as traps, can be stocked to reduce purchases in future years, but few savings can be realized by purchasing pesticides in bulk. It is probably best to keep no more than a 60-day pesticide inventory to assure product freshness and to avoid limiting

cash flow. Pest managers should be able to anticipate needs to fit a 60-day buying schedule.

"In-house" or Contracted Services

IPM programs can be successfully implemented by "in-house" school employees or by contracting with a pest control company. A combination of in-house and contracted functions may be mixed and matched to the needs and capabilities of the school system. Both approaches have advantages and disadvantages. Individual school systems must decide what is best for them given their unique circumstances. Whether you choose in-house or contracted services, pest management personnel should be trained to—

- Understand the principles of IPM.
- Identify pests and associated problems or damage.
- Monitor infestation levels and keep records.
- Know cultural or alternative methods.
- Know recommended methods of judicious pesticide application.
- Know the hazards of pesticides and the safety precautions to be taken.
- Know the pesticide label's precautionary statement(s) pertaining to exposure to humans or animals.

"In-house" Services

One of the most important tasks for an in-house program is training staff to function within an IPM context. Universities and State Cooperative Extension Services have the expertise to meet most IPM training needs. Needed training materials that are not already available can be developed jointly between the School District and the Extension Service.

Contracted Services

Pest control firms should work with the pest manager and the responsible school official to solve pest control problems.

Use of an outside pest control firm may increase costs but eliminate the need to hire and train personnel and store pesticides. The contract should specify the use of IPM principles and practices in meeting pest management objectives.

When choosing a pest control firm, contact your local Better Business Bureaus or state regulatory agencies for information about whether they have received complaints about a pest control company. State regulatory agencies can also provide information on pesticide applicator certification.

The pest management services contract should include IPM specifications. Contracts should be written to provide expected results. Pest management objectives specific to the site should be jointly developed, agreed upon, and written into the contract. Any special health concerns (such as those for children, or for individuals with allergies, etc.) should be noted and reflected in the pesticides that can be utilized, or excluded from use.

For More Information

For additional copies of this document, contact—

- Public Information Center
  U.S. Environmental
  Protection Agency
  401 M Street, SW
  Washington, DC 20460
- Field Operations Division (H7506C)
  Office of Pesticide Programs
  401 M Street, SW
  Washington, DC 20460

For information about pesticides, contact—

- National Pesticide
  Telecommunications Network
  1-800-858-PEST (toll-free)
  8 a.m. to 6 p.m.
  Central Standard Time.

Operators provide the medical, veterinary, and professional communities and the general public with—

- Information on recognizing and managing pesticide poisonings.
- Referrals for laboratory analyses, investigation of pesticide incidents, and emergency treatment information.
- Tips for using pesticides correctly.
- Clean-up and disposal procedures, and much more.

United States
Environmental Protection Agency
(H7506C)
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